DOCUMENT RESUME

ED 324 630 CS 010 235

AUTHOR Anderson, Jonathan
TITLE New Technologies and Literacy.
PUB DATE Jul 90
NOTE 10p.; Paper presented at the World Congress on Reading (13th, Stockholm, Sweden, July 3-6, 1990).
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Animation; *Computer Assisted Instruction; Computer Graphics; *Computer Software Development; *Educational Technology; Elementary Education; Foreign Countries; Literacy; Microcomputers; *Reader Text Relationship; *Reading Instruction; Teaching Methods; Tutorial Programs; Word Processing
IDENTIFIERS Australia; *Text Design

ABSTRACT

Computer-based technologies are rapidly changing fundamental concepts about texts and how students interact with and learn from those texts. Early use of microcomputers included drill and practice work, tutorial programs, and word processing. In conjunction with information storage devices like magnetic and laser disc, the microcomputer has also brought about an enriched text for use in the classroom. Not only do students have access to vastly increased stores of information through which they may navigate, browse, or select, but text is dynamic with overlapping layers that increase the potential for obtaining meaning. One additional layer or dimension popular with young students is graphics added in book text. Where computers successfully go beyond book text is with the overlaying of animation and sound, while the harnessing of motion video results in interactive multimedia learning environments. (Eight figures containing computer graphics are included.) (KEH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Jonathan Anderson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

NEW TECHNOLOGIES AND LITERACY

Jonathan Anderson
Flinders University of South Australia

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED324630

The theme of this paper is that computer-based technologies are changing our notions of literacy and changing how students learn from text. The hypothesis I want to advance is that the tools we use change us – and so as new educational uses are developed for computers, the very concepts of text that we have held until now are changing, and will continue to change. In presenting evidence in support of this hypothesis, I draw on the changing ways computers have been used by teachers in Australian classrooms. It is a short story in terms of time, spanning just a decade.

Early use of microcomputers: the first wave

At the end of the 1970s, one of Australia's national daily newspapers, *The Australian*, was to report:

> Most of us in the computer industry still work with or around macro or minicomputers. However, we have all heard of that new wave – The Micro. Many of us probably have a fairly woolly idea of what it is, or may become, and a touching faith in the excellence of life as micros proliferate throughout the world.

A few Australian teachers at the start of the 1980s were beginning to explore how microcomputers might be used in the classroom. A not uncommon view at that time was to think about the computer as teaching the student. Thus Clutterbuck (1980) in an overview for language teachers described some of the early programs that were essentially of the drill and practice or tutorial type. In the early 80s though, it was still quite rare to see microcomputers in primary schools.

Drill and practice

Most teachers are familiar with drill and practice type computer programs. At the most basic level, drill and practice programs advance sequentially through a series of items, students progressing to successive items after successfully completing preceding items (with prompting if necessary). Refinements permit branching forward or backward according to the needs of students, provision for varying levels of difficulty, and the facility to focus on areas of weakness.

Tutorial programs

Tutorial programs operate somewhat similarly to drill and practice except that new content or new concepts are introduced. The material is usually presented to students in small modules or frames. The rate of presentation is under student control, requiring normally a key to be pressed to proceed with a particular sequence. Tutorial programs may also include multiple-choice questions and incorporate branching for additional explanation or repetition.

CS010235

Characteristics of early microcomputer software

Characteristics of good tutorial and drill and practice programs are that they provide practice for automaticity; the teacher is able to review student performance; new content may be presented or previous content reviewed; programs are self-paced and can provide immediate feedback. They are also relatively easy to produce.

On the negative side, drill and practice programs usually do not utilise the full potential of the microcomputer; they often add little to learning that cannot be provided by more traditional, less expensive means; and, if students are restricted to just this kind of computer program, it is a dreadfully dull diet. The user is driven: the computer is tutor.

At the beginning of the 80s, content in both drill and practice and tutorial programs consisted nearly always of just text; more often than not, the text was presented in upper case; and computer monitors invariably displayed white characters on a black background.

The second wave: text tools

One development that did much to raise the general community's understanding of computers and information technologies in Australia during the first half of the 80s was Information Technology Week. So successful were these promotion weeks judged to be that after five years the Commonwealth Government decided to extend the activity and supported an Information Technology Month in 1984. As far as primary schools were concerned, one activity during Information Technology Week 1982 was to distribute to all schools without cost a rather different kind of software package that typified in some ways the second wave of text tools for microcomputers.

Databases

The First Fleet Database: Convicts and Computers, the software package distributed during Information Technology Week 1982, provided schools across the country with a taste of how computers were used in the wider world of business and industry as a tool for searching and retrieving information. The courseware package comprised computer disk, comprehensive student and teacher manuals, and accompanying worksheets. Perhaps it was because this particular database was freely distributed, perhaps also because of its high quality, but the use of databases as a new reading medium, a repository of an enormous store of knowledge which students could interrogate, became established quite early as a worthwhile educational activity in the nation's classrooms. This program became the forerunner of many databases developed specifically for student use.

At the end of the decade, writing in a special themed issue on new technologies and reading in the International Reading Association's *Journal of Reading*, Hancock (1989) summed up how students at primary and secondary schools learn from databases using new reading strategies:

> ... they define their topic of enquiry, determine the questions they want to answer, systematically collect the information, record it in a uniform way, form tentative generalisations, test their generalisations by analysing the data, then draw conclusions with support from their data (Hancock 1989, p. 583).

In searching for information, students in fact create new information as they establish relationships. Furthermore, in such activities they read and write for real purposes.

Word processing

In an extended review of computing in Australian schools written at the end of 1983 and published at the beginning of the following year (Anderson 1984), I highlighted some of the innovative work being done with word processors in many schools, particularly in primary classrooms. Even at that stage certain trends were noted: for example, that students tended to write more when using word processors, for this increased length to reflect a wider variety of syntactic structures, and that there was a greater enthusiasm for writing and even a willingness to revise. The actual style of writing, too, changed subtly as students used, for instance, the repeat function of computer keys. Other observations were that students were better able to note errors in their writing, particularly spelling errors, when using a word processor.

By 1985 it was reported that the application of microcomputers to have captured the most widespread interest and enthusiasm, among teachers and students alike, was word processing (Anderson 1985). Teachers had discovered that here was an application that opened the window to creative writing; and students, too, found in word processing a new and powerful tool for communicating.

Spelling checkers

Along with word processors, teachers and students began to use spelling checkers. True, there was some questioning whether the use of such tools would lead to a further decline in spelling, but as more powerful word processors routinely provided spelling checkers and sometimes a thesaurus as well, this initial reaction was dispelled. What teachers soon realised was that the computer makes no judgement about the correctness or otherwise of spelling: the user needs to and, as a rule, this requires dictionary work. What the computer can often do effectively, is draw attention to typographical errors; it may also (according to the tool being used) highlight repetitive use of words, or inconsistencies in spelling, as well as archaisms and the use of sexist language. Users frequently comment that spelling checkers make them more aware of vocabulary and usage.

Characteristics of second wave software

There are two chief characteristics of the software described here as *second wave*. First, and this distinguishes these applications most clearly from *first wave* or first generation applications, the user is to a large extent in control and directs the learning which takes place. The user is driver: the computer is tool. A second distinguishing feature is that applications are for the most part content-free. That is to say, students insert their own content or ask questions of their choosing. Software with these two features is thus multi-purpose, able to be used with students at different year levels or with different ability groups.

In one other respect, however, second and first wave applications are similar. The hallmark of all the applications so far described is that they are text oriented. The text may be moved around as in word processing but *computer* text of the mid 80s was not too different from *book* text (except that computer text was still usually white on black).

New dimensions or third wave applications

Just as silent movies in time gave way to *talkies*, the day of purely text-based, silent, educational software was limited. In the second half of the 80s, a new generation of

applications emerged which would add new dimensions to the largely stationary, linear text of the earlier period. What potential these *third wave* applications have for developing literacy is still being explored.

Text and graphics

Optical storage devices for holding vast amounts of information had been around for some years but developments took off after 1985. In that year Phillips and Sony released laser disc drives to be used with computers. CD-ROM had arrived. One whole issue of the computer magazine *Byte* in early 1986 was devoted to optical technology. In an influential publication (Lambert and Ropiequet 1986), CD-ROM was described as "the new papyrus".

CD-ROM is a compact disc (hence CD) containing information which can only be read (hence ROM or Read Only Memory). One of the first products to be available on CD-ROM was Grolier's *Electronic Encyclopedia*. In printed form, this set of encyclopedias comes in 20 volumes; the electronic equivalent, comprising approximately 9 million words of text together with an index to every word for quick access, occupies about a fifth of a 12 cm laser disc. The computer program accompanying the electronic encyclopedia allows users to browse through articles or to search for information in articles, fact boxes, bibliographies and tables, using complex search strategies.

Another new development, released with great fanfare in 1987, was a program which allows users to browse at will through stores of information comprising text and pictures. This was HyperCard. The following illustration (Figure 1) gives a flavour of a HyperCard stack about dinosaurs. In this stack you may choose a particular time period or look up a particular dinosaur. Clicking on the dinosaur (with a mouse) brings up information about genus, size and habitat. The buttons at the bottom of each card allow the user to branch forwards, backwards, to the beginning, or exit – wherever the user wishes.

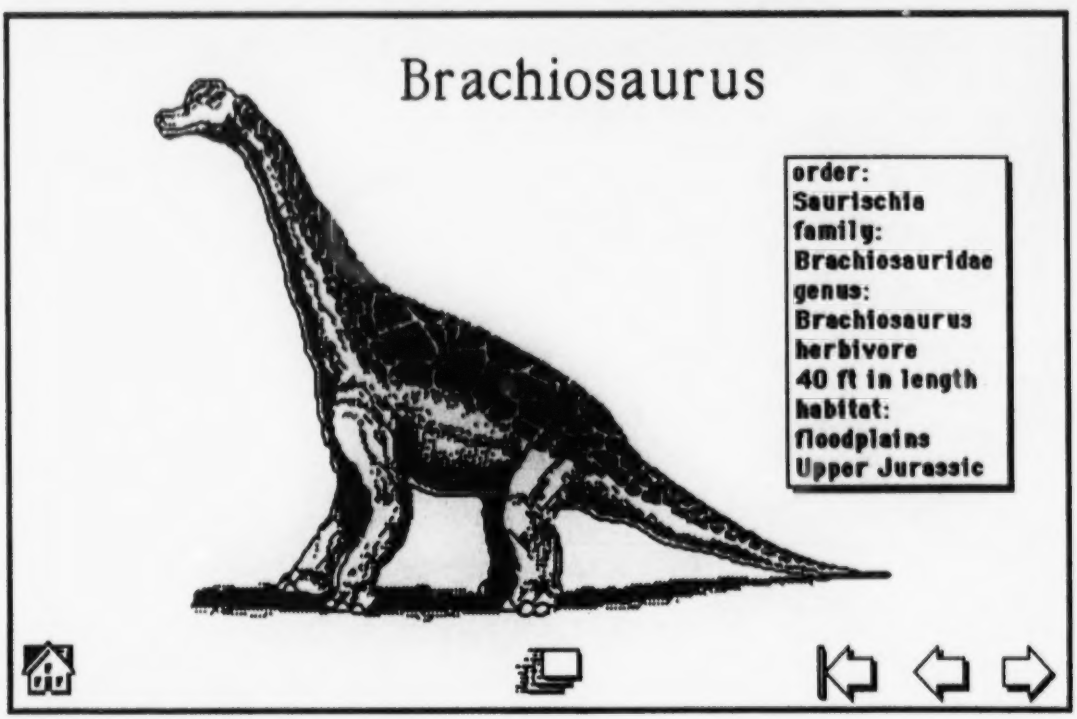

Figure 1: *Reading a HyperCard stack about dinosaurs*

The addition of graphics, together with the facility to branch in any desired direction in the search of information, added a new dimension to educational software.

Text, graphics and animation

Quite popular programs with younger children in many Australian schools are those that add movement to graphics. To try to illustrate, Amanda Stories have produced some delightful children's story stacks which captivate young learners through their simple graphics and animation. In *Your Faithful Camel*, for example, young readers face different choice points along the way as Figures 2 and 3 illustrate. By clicking in different parts of the picture, the story advances, sometimes quite unexpectedly, and the animation adds to the interest and enhances meaning. Readers actively determine the path the story takes.

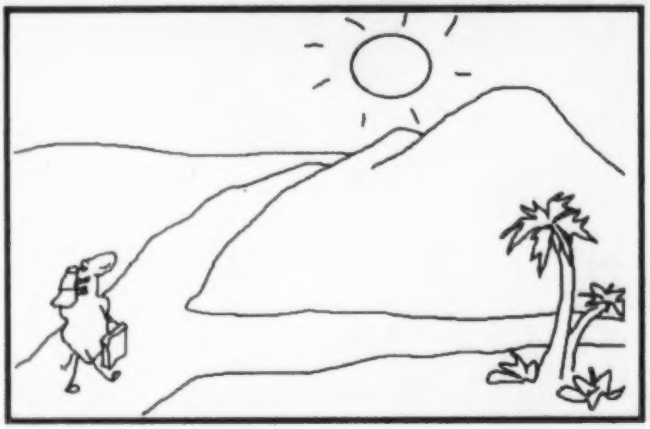

Figure 2: *The reader determines which path to travel*

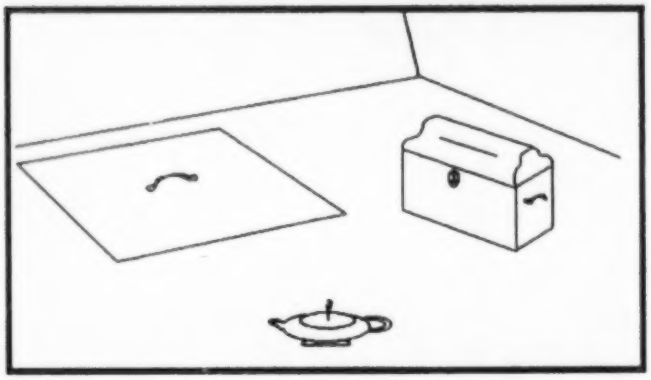

Figure 3: *A choice of objects to explore*

Programs such as *Your Faithful Camel* add yet another dimension to computer software. Such programs contain text (limited in this particular program) plus graphics and animation.

Text, graphics, animation and sound

The addition of sound adds another dimension again. *Star Date*, available on the CD-ROM Discovery disc which comes with the Macintosh CD-ROM drive, is a good illustration.

The user sees on screen a map of the solar system and a voice commentary invites you to click on a planet. The commentary continues as you go on a voyage of discovery. You see the orbit of planets and the rotation of moons, all the while listening to an explanation of the events portrayed.

A colleague of mine at Flinders University, Dr Hart, has developed a HyperCard stack called *Shoko's Exercises* for use by very young children learning Japanese. At the school where the program is used, the Japanese teacher comes on two days a week. On the other days, the children have the benefit of audio-visual exercises with authentic Japanese speech. For instance, when students click on Songs with words (Figure 4), the program branches to a song with the words appearing in Japanese and English (Figure 5), and students hear the song as sung by their Japanese teacher, following the usual practice when she is at the school.

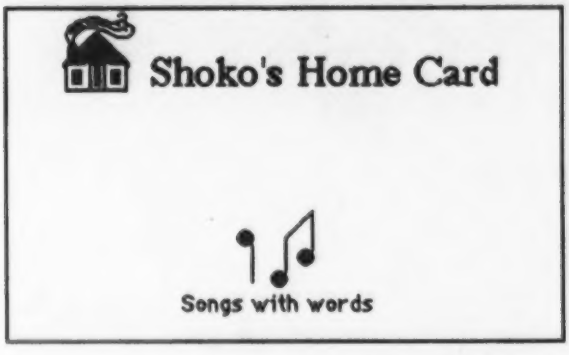

Figure 4: *A HyperCard stack for learning Japanese*

Kon-ni-chi-wa, Min-na	Hello, everybody
Kon-ni-chi-wa, Min-na	Hello, everybody
Kon-ni-chi-wa, Min-na	Hello, everybody
Gen-ki desu ka?	How are you?

Figure 5: *The greeting song (from Shoko's Exercises) sung in Japanese*

As another activity, students can practise their Japanese vocabulary. When a card such as that in Figure 6 appears, learners may click on the mouth and hear the word 'dog' spoken in Japanese – ***inu***. The pronunciation is authentic, which provides a model for students as they work on their own or in groups. Pressing the button with a question mark takes them to the next word to try; and the Home button returns them to the beginning. The cards are presented randomly.

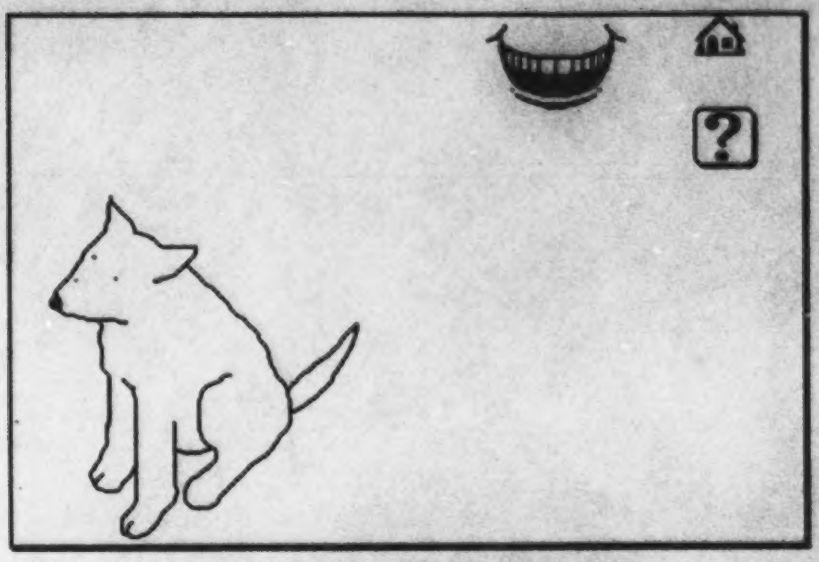

Figure 6: *Sight cards with sound added*

Yet another activity is the simple matching game of concentration (Figure 7), played here on a computer. The difference, though, is that with this software students can ask for a clue and have the computer say the words, again in perfect Japanese.

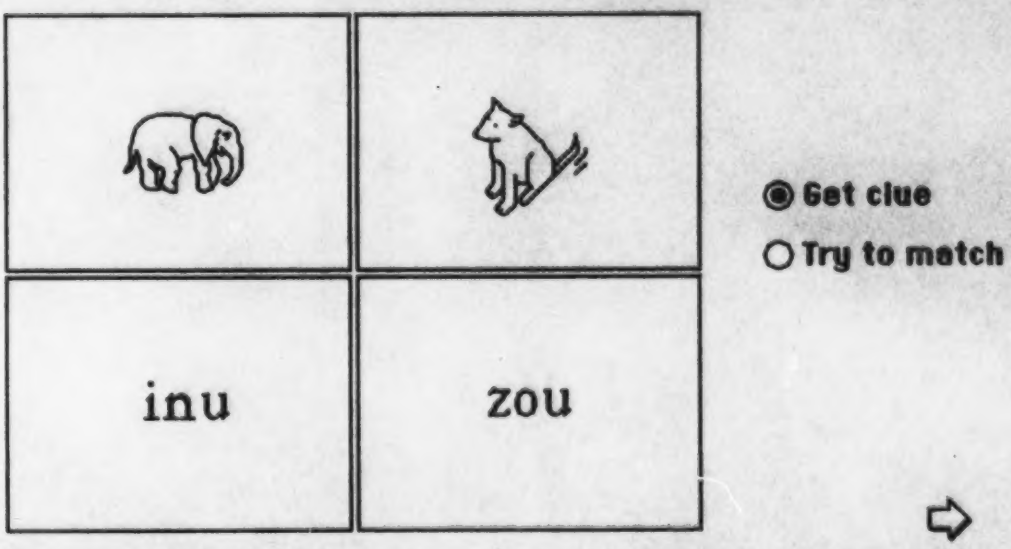

Figure 7: *Match picture and word – point to a picture to hear it sounded for an added clue*

Different levels are catered for and in the matching game illustrated in Figure 8 students practise their knowledge of Japanese characters, again having the facility to hear their teacher's faultless pronunciation should they want a clue.

Figure 8: *Matching picture and Japanese characters, with option of a clue*

Shoko's Exercises is a drill and practice type program but it is quite different from the first wave programs described at the beginning of this paper. In the third wave form, young learners see text but the text is augmented by graphics (essential for a character-based language like Japanese); there is animation; and, most importantly for language learning, there is real speech.

Towards the end of 1989, Encyclopedia Brittanica announced a CD-ROM on which its entire 26-volume edition is stored. At the product release, the President of Brittanica Software commented that encyclopedias had changed little in form since reference works comprising articles by many contributors presented in alphabetic order first appeared in 1704. New search indexes in the next generation of encyclopedias, however, will enable students to explore the globe with a zoom finder; they will be able to listen to recordings of famous speeches such as John F Kennedy's inaugural address; choose to play music of the great composers from Bach to Bizet; and hear sounds like the purrs, barks and songs of animals and birds. He concluded that with sight, sound and animated illustrations, the new multimedia approach was designed to revolutionise scholarship in the 1990s. A new learning era would begin.

Blanchard, Mason, and Daniel, in the third edition of *Computer Applications in Reading* (1987), might have been predicting these very developments when they wrote:

> Computer technology develops in leaps and bounds. The development of the transistor was one leap, the advent of the microcomputer another. Now, the field is poised on the verge of another leap into the optical era. That move could have profound impact on reading education. (Blanchard, Mason, and Daniel, 1987: 153).

Text, graphics, animation, sound and motion video

Text, graphics, animation, sound and motion video, all come together with interactive videodisc coupled to a computer. There have been several such interactive videodiscs produced for the classroom. Two to commemorate the 900th anniversary of the Domesday Book were videodiscs of life in Britain in the 80s, compiled by the BBC and known as the Domesday Project.

Another such videodisc from Australia is *The Aussie Barbie*, a learning resource for those learning English as a second language. A little like the examples above, learners can navigate through a language database, but now they interact with real screen characters. They hear and practise language in a social context, such as at a barbeque, where anything

and everything can be talked about – sport, occupations, health, where you live, family, interests, even gossip about the other guests. Not only do learners hear the target language, they witness paralanguage (gestures, shrugs, facial expressions, movements of the body, and so on). As the disc's designer, Peppard, noted:

> The thrust of the videodisc is how ideas are communicated in English. The function or notion might be in reality conveyed in a paralinguistic form: a wink, ummm or ahhh, or eyes down (Peppard 1989: 631).

Videodisc adds yet a further dimension – motion video – overlaid on text, graphics, animation and sound. The end result is a revolutionary learning resource.

Hypothesis revisited

This paper began with the statement that computer-based technologies are changing our notions of literacy and changing how students learn from text; and the hypothesis was advanced that concepts of text are changing in the process.

What the microcomputer has brought about, in conjunction with information storage devices like magnetic and laser disc, is enriched text. Not only do students have access to vastly increased stores of information through which they may navigate, browse or select, but the text is dynamic with overlapping layers that increase the potential for obtaining meaning. One layer or dimension to be added is graphics but text and graphics are present in *book* text. Where computers go beyond book text is with the overlaying of animation and sound, while the harnessing of motion video results in interactive mutimedia learning environments.

This paper is titled *New Technologies and Literacy*. If the arguments and evidence presented are accepted, a better title might have been *Technologies and New Literacy*.

References

Anderson, J. *Computing in Schools: An Australian Perspective*. Melbourne: Australian Council for Educational Research, 1984.

Anderson, J. (Ed.). *Computers in the Language Classroom*. Perth: Australian Reading Association, 1985.

Blanchard, J.S., Mason, G.E. and Daniel, D. *Computer Applications in Reading* (3rd. ed.). Newark, Delaware: International Reading Association, 1987.

Clutterbuck, J.M.G. The use of the computer in teaching foreign languages. *Unicorn*, 6, 263-268, 1980.

Hancock, J. Learning with databases. *Journal of Reading*, 32 (7), 582-589, 1989.

Lambert, S. and Ropiequet, S. (Eds.) *CD-ROM: The New Papyrus*. Redmond, Washington: Microsoft Press, 1986.

Peppard, H. Language learning with laser. *Journal of Reading*, 32 (7), 628-633, 1989.